The Application of MEBO in the Repair of Alkali Injured Corneal Epithelium

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[Abstract] Purpose: Discuss the effect of applying MEBO Burn ointment in the repair of corneal epithelium in alkali burns. Method: Compare 70 alkali eyes burns cases using MEBO with another 70 same stage and similar injuries cases using traditional method. Result: Index, such as time for healing, transformation and differentiation, final result, etc., between two groups of I, II degree corneal burns are very similar, however, there are statically differences between two groups of III, IV degree corneal burns. Corneal epithelium regenerate earlier in the therapeutic group than in the control group; recovery of the vision is also better than the control groups (P<0.05). Conclusion: MEBO can improve the regeneration of the corneal epithelium in alkali burns, and also the recovery of the vision.

[Key Words] Alkali burns of the cornea; MEBO Burn ointment; Treatment

When alkali burns on eyes, alkali materials enter eyes and usually rapidly cause corneal epithelium necrosis and disruption that make stroma and intraocular tissue further injury. Therefore, treatment principle should let corneal epithelium smoothly heal as soon as possible to minimize the injury toward intraocular tissue and to avoid complications, such as infection, ulceration, etc. Though already have some experience in how to expedite corneal epithelium healing clinically, the result is not totally satisfied. From 1997, editor had started to add MEBO Burn ointment on the base of traditional therapy, and gained satisfied result. Here is the conclusion:

I Clinical Information

Since January, 1997 to December, 2000, we treated 70 cases of alkali burns on eyes with MEBO, in order to understand the therapeutic result further of MEBO, we compare 70 cases in similar injuries with traditional therapy at the same time, former is treatment group while later is control group.

Treatment group: 70 cases, 90 eyes. 50 males with 64 eyes; 16 females, 26 eyes. Oldest is 56 years old, youngest is 3 years old, consist of 15 eyes of ammonia burns, 52 eyes of lime and cement burns, 11 eyes of house-hold cleanser burns, 12 eyes of fire crackers injuries. Under the Criteria of Ocular Alkali Burns issued by the Chinese Ocular Trauma and Occupational Eye Disease Committee: 10 eyes in I degree, 52 eyes in II degree, 22 eyes in III degree, and 6 eyes in IV degree.

Control group: 70 cases, 94 eyes. 60 males, 74 eyes; 16 females, 20 eyes. Oldest is 60 years old, youngest is 25 years old, consist of 18 eyes of ammonia burns, 62 eyes of lime and cement burns, 12 eyes of house-hold cleanser burns, 2 eyes of fire crackers injuries. 10 eyes in I degree, 54 eyes in II degree, 24 eyes in III degree, and 6 eyes in IV degree. Causes and situation among patients in two groups are
similar. The shortest time to consult medical aids is 1 hour as long as the longest is 48 hours.

II. Treatment and Observation

Patients of two groups were all received conjunctiva sac wash with normal saline right after been admitted to the clinic, and attentively clear the alkali solids, such as lime, cement, etc., that stuck in the fornical part under local anesthesia. Twice washing in the initial 3 days until the pH index of conjunctiva sac normalized.

Patients of two groups were all administrated intravenous infusion of VitC 5.0g with 10% Glucose 500ml and VitC 200mg par oral, tid, until recovered. Patients from II to III degree were administrated subconjunctiva injection of VitC 100mg once a day.

All the patients received total or local antibiotic prophylaxis according to their situation, and took VitB, VitAD by oral to enhance corneal nutrition, instilled atropine to dilate iris, instilled dichlorphenol sodium for prophylaxis, instilled artificial tears and Solcoseryl Eye-Jel. Covered the injured eye with the dressing and press with the bandage to prevent window-cleansing type injury on epithelium during twinkling.

Treatment group applied MEBO on the surface of conjunctiva and cornea by ophthalmology glass stick besides the therapy mentioned above, details are: 10 eyes in I degree applied MEBO qid till total recovery; 80 eyes in II to IV degree with severe inflammatory reaction continue autoblood 4ml subconjunctiva injection twice and applied MEBO at the same time until a week later than the completion of corneal epithelium regeneration and continue the use if ulceration on the cornea were found; Those with light inflammation simply apply the MEBO locally.

During the therapy of these two groups of patients, attention to the local changes on the cornea, recovery of the vision and the healing of the lesion, as long as the complications, such as keratitis and ulcers.

III. Results and Analysis:

Control Group: The regeneration of corneal epithelium of I to II degree burns completed in 4 days and transformation in 1 week; cornea is transparent without angiopoiesis, and the vision all recovered above 1.0. The period for corneal epithelium regeneration in III degree burns are minimal 8 days as long as maximal 12 days, and the transformation in minimal 10 days and maximal 18 days; None corneal ulcerations but 2 eyes with angiopoiesis. Visions in 4 eyes recovered above 1.0, in 6 eyes recovered to 0.6-0.9 while 14 eyes recovered to 0.1-0.5. The corneal regeneration in IV degree is minimal in 13 days and maximal in 18 days. Only one case transform to transparent at final. 1 eye recovered to 0.1 while 5 eyes recovered less than 0.1.

Treatment Group: The regeneration of corneal epithelium of I to II degree burns completed in 3 days and transformation in 1 week; cornea is transparent without angiopoiesis, and the vision all recovered above 1.0. The period for corneal

Epithelium regeneration in III degree burns are minimal 7 days as long as maximal 10 days, and the transformation in minimal 7 days and maximal 14 days; None corneal ulcerations and angiopoiesis. The corneal regeneration in IV degree are minimal 10 days and maximal 15 days, 2 eyes transform to transparent in 15 days as long as the other 4 eyes were not transparent, 3 eyes with angiopoiesis. 1 eye recovered to 0.4, 3 eyes recovered to 0.1-0.3 while 2 eyes recovered less than 0.1.

The result above said: patients of I to II degree corneal burns in two groups are basically similar in healing time, transformation time, and final results. However, differences exist between groups of III to IV degree burns. The completion of corneal epithelium regeneration in treatment group is earlier than control group; vision recovery is also apparently better than control group. Take 0.5 as the line to statistic vision recovery in III degree, there are obvious differences between groups (P<0.05); patients of IV degree burns in the control group only one eye vision recover to 0.1 while the others are all under 0.1, however, there are only two cases under 0.1 in treatment group while the other 4 cases are all above 0.3 or 0.4.

IV Discussion

The pH in conjunctiva sac increase while corneal alkali burns, this base environment will improve the dissolve of compound and laceration of cell lipid, thus, causes sudden death and disruption of corneal epithelium. The damage confine can be determined under slit lamp, light burns revealed partial injury on corneal epithelium while severe burns can be totally necrosis and disrupted.[1] Therefore, we should improve the corneal epithelialization as soon as possible at the early stage of corneal alkali burns, and do the best to recover the vision.

The healing of corneal epithelium including the regeneration of epithelium and the upcoming morphological and functional transformation of epithelial cell at the initial stage. Partial necrosis of the corneal epithelium and the residual corneal epithelium around the lesion in light alkali burns, the regenerated epithelium comes from these residual cells or corneal layer stem cells, under through reasonable therapy then can smoothly complete the regeneration and finally transform into normal transparent and stable epithelial cells. The cases in this group, there are no obvious differences between two groups of I and II degree burns cause the injury is milder. However, there are more vasculization, severe inflammatory reaction, lower transparency of regenerated corneal epithelium, containing cuboidal cells and pterygium even angiopoiesis in severe alkali burns, and finally result in abnormality of the ocular structure. The factors that involve the rate of corneal epithelium regeneration are the amount of residual corneal epithelium, the confine of the conjunctiva necrosis and the inflammatory reaction, etc. As the inflammatory occurred will decline the regeneration of the corneal epithelium and decline the integrity between epithelium and the basal layer of the lesion, and the decline of the epithelium transformation will also result in recurrent epithelial erosion even the continuous defect. Especially the inflammatory factors in the post-traumatic 72 hours, the transportation of polymorphonuclear neutrophils will impede the transportation of epithelial cells, the regenerated epithelium cannot use the injured basal membrane, thus, decline the
integrity between epithelium and the basal membrane and result in epithelium erosion and disruption. Therefore, it is important to control inflammatory at the early stage in alkali burns. Because the inflammation in alkali burns are mostly non-infectious, besides total or local antibiotics prophylaxis, local physiological moistening and successful drainage can stable the cell membrane and lysosome membrane, thus, decline the release of inflammatory substance and chemokine to relief the inflammation and improve the corneal epithelium regeneration indirectly. The outcome of the 90 eyes of 70 cases in this group that under through the MEBO therapy proved this point. Early conjunctiva sac irrigation not only improves the pH environment but also cleans the necrotic and disrupts tissue; to use artificial tears in order to improve the quality of tears. The data from this group reveals that 88 eyes in 90 eyes successfully complete the corneal epithelium regeneration, lessen time, fewer complications and better vision recovery in comparison of the control cases. The main reason is that MEBO can neutralize and enhance the local microcirculation to improve the epithelialization. Someone reported that MEBO can maintain the physiological moisture and neutralize acid and base, at the same time, can hydrolyze, enzymolysis and combine with toxic substance to disintoxicate.[2] MEBO can avoid interval tissue from necrosis and can reverse the vital tissue as possible that improve the epithelial cells regeneration.[3]

Reference